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OBSERVATIONS ON THE SUNDEW.

BY MRS. MARY TREAT.

On the morning of July 7th, I started in search of *Drosera filiformis* and found my plant in Atlantic Co., New Jersey. It was in full bloom and growing as thick as it could well stand, on either side of an extensive cranberry plantation. This charming plant, with its pretty pink blossoms, together with the dew-like substance exuding from the glands (the glands surmount the bristles or hairs which cover the long thread-like leaves), was one of the most beautiful sights I ever beheld. From former observations I had supposed this plant caught only small insects, but now found I was mistaken; great Asilus flies were held firm prisoners, innumerable moths and butterflies, many of them two inches across, were alike held captive until they died—the bright flowers, and brilliant, glistening dew luring them on to sure death. But what is the use of this wholesale destruction of insect life? Can the plants use them? Upon examination I find that after the death of the larger insects, they fall around the roots of the plants as if to fertilize them, but the smaller flies remain sticking to the leaves.

Careful and repeated experiments during several days revealed the fact that on some days the plants work much better than on others. Whether it was the electrical condition, or amount of moisture in the atmosphere, is yet to be ascertained.

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I experimented with three species of these plants—*D. filiformis*, *D. longifolia*, and *D. rotundifolia*. I carefully removed them from all atmospheric agitation, and found they were the most active on the eleventh of July. I will therefore give the record of this day's experiments, and the state of the weather.

July 11th, thermometer stood thus—7 A. M., 68°; 2 P. M., 79°; 9 P. M., 69°. Rain early in the morning, one-third of an inch. Wind in the morning, N. E.; 2 P. M., S. E.; 9 P. M., S. E.; with rising barometer from 29·96 to 30·05.

July 11th, 10 o'clock, A. M., I pinned some living flies half an inch from the leaves, near the apex, of *D. filiformis*. In forty minutes the leaves had bent perceptibly toward the flies. At twelve o'clock the leaves had reached the flies and their legs were entangled among the bristles and held fast. I then removed the flies three-quarters of an inch farther from the leaves. The leaves still remained bent away from the direction of the light toward the flies, but did not reach them at this distance.

Whether the action of the flies' wings may have created sufficient force to bring the leaves near enough to entangle the flies is a question I have not yet satisfactorily settled in my own mind, for dead flies did not seem to have the same power as living ones.

Fifteen minutes past ten of the same day, I placed bits of raw beef on some of the most vigorous leaves of *D. longifolia*. Ten minutes past twelve, two of the leaves had folded around the beef, hiding it from sight. Half past eleven of the same day, I placed living flies on the leaves of *D. longifolia*. At twelve o'clock and forty-eight minutes, one of the leaves had folded entirely around its victim, and the other leaves had partially folded and the flies had ceased to struggle. By half past two, four leaves had each folded around a fly. The leaf folds from the apex to the petiole, after the manner of its vernation. I tried mineral substances, bits of dry chalk, magnesia and pebbles. In twenty-four hours neither the leaves, nor the bristles had made any move like clasping these articles. I wet a piece of chalk in water, and in less than an hour the bristles were curving about it, but soon unfolded again, leaving the chalk free on the blade of the leaf.

The bristles around the edge of the leaf of *D. rotundifolia* are longer than on those of *D. longifolia*, but the leaf of the former does not fold around a fly as it does in the latter—simply the bristles curve around the object, the glands on the ends of the bristles touching the substance, like so many mouths receiving nourishment.

Half past 10, A. M., I placed raw beef on some leaves of *D. rotundifolia;* by 1 o'clock the inner bristles were curving about it, and the longer bristles on the outer edge of the leaf were slowly curving upward. By 9 o'clock, in the evening, all the bristles of three of the most vigorous leaves were clasping the beef, almost hiding it from sight, while an equally vigorous leaf made no move like clasping a bit of dry chalk.

About 10 o'clock in the morning, I placed bits of raw apple on some of the leaves of the last named species; by 9 o'clock in the evening part of the bristles were clasping it but not so closely as the beef. By 10 o'clock next day, twenty-four hours, nearly all the bristles were curved toward it, but not many of the glands were touching it. So it would seem that these plants are really carnivorous, that they prefer, and absorb animal substances directly through their leaves. And Mr. Darwin says that by pricking a certain point in the leaf of Drosera, he can paralyze half of it, and this indicates nerves!

The following is a brief summary of the experiments.

First, with *D. filiformis.*

July 11th, 10 A. M. Pinned living flies half an inch from apex of *D. filiformis.* 10 o'clock and 40 minutes; the leaves are bent perceptibly toward the flies. 12, M., the leaves have reached the flies, and the flies' legs are entangled in the bristles and held fast by the sticky substance exuding from the glands.

Second, with *D. longifolia.*

10 o'clock and 15 minutes, A. M., I place raw beef on the leaves of *D. longifolia.* Ten minutes past 12, the leaves are folded around the beef. 11½ o'clock A. M., I place living flies on the leaves of this species. 12 o'clock and 48 minutes, P. M., one of the leaves has folded entirely around the fly. 2½ o'clock, P. M., four leaves have each folded around a fly.

Third, with *D. rotundifolia.*

10 o'clock and 35 minutes A. M., raw beef on leaves of *D. rotundifolia.* 1 o'clock, P.M., the inner bristles are curving about it, and the longer bristles on the outer edge of the leaf are slowly curving upward. 9 o'clock, P.M., all the bristles of the most vigorous leaves are clasping the beef. 10 o'clock A. M. I place bits of raw apples on the leaves. 9 o'clock P. M., part of the bristles are

clasping them. July 12th, 10 o'clock, A. M., nearly all the bristles are curving toward the bits of apple, but very few of the glands are touching them.

THE SLATES OF THE TACONIC MOUNTAINS OF THE AGE OF THE HUDSON RIVER OR CINCINNATI GROUP.*

BY PROFESSOR J. D. DANA.

IN my study of the Stockbridge limestone and the associated rocks in Berkshire county, Massachusetts, I have found that the ridges are often, if not always, synclinals. They consist of the slates or schists (and sometimes quartzite) overlying the limestone; and in the downward flexures of the limestone, during the period of disturbance and metamorphism which made the mountains, the overlying beds or part of them were folded together into a compact mass which has withstood degrading agents, while the same beds in the anticlinals or upward flexures were extensively broken and have disappeared. The slate ridges are then nothing but squeezes of the slate formation between the sides of a limestone synclinal.

The Taconic mountains lie on the western border of the Berkshire limestone region; and, in general, the dip of the limestone, as well as of the Taconic slates is to the eastward, and hence the slates being underneath are seemingly the older. They are actually so, unless the Taconic ridges are also synclinals, with an eastwardly inclined axis, like some of the Berkshire mountains. Until recently I had regarded the apparent order of superposition as the true order of succession, that is, I had supposed that the limestones were newer than the Taconic slates. The conclusion seemed to be confirmed by finding at different places the slates and limestone with the same high easterly dip, the slates undermost.

But a few weeks since, on an examination of the eastern base of Mt. Washington, the highest part of the Taconic range in southwestern Massachusetts, along the road just east of the highest

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* Read at the Portland Meeting of the Amer. Assoc. Adv. Science.